

## **BLACK TERN (*Chlidonias niger*)**

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### **Criteria Scores**

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
10	5	7.5	5	0	0	10

### **Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), Priority 3. Included on CDFG's (1992) unprioritized list but not on the original prioritized list (Remsen 1978).

### **Breeding Bird Survey Statistics for California**

Data inadequate for trend assessment (Peterjohn and Sauer 1997, Sauer et al. 2000).

### **General Range and Abundance**

Comprised of two subspecies, *C. n. niger* in the Old World and *C. n. surinamensis* in the New World. In North America, breeds widely across central and southern Canada and the northern United States (AOU 1998, Shuford 1999). Generally patchily distributed on the fringes of its breeding range; largest concentrations in zones of highly productive wetlands, particularly in the Prairies (Dunn and Agro 1995, Peterjohn and Sauer 1997). Migrates broadly across North and Middle America to reach wintering grounds mainly in marine and marine-coastal areas of Middle and northern South America (Shuford 1999). Also occurs in these habitats in summer outside the breeding range, mainly from the Gulf Coast south to northern South America and at the Salton Sea in southern California (Dunn and Agro 1995).

### **Seasonal Status in California**

Occurs primarily as a migrant and summer resident from mid-April to mid-October; breeding season extends from early May to early August.

### **Historical Range and Abundance in California**

Grinnell and Miller (1944) described the black tern as a “locally common” breeder that nested in two distinct areas: the Modoc Plateau region and mountain valleys of northeastern California, and the lowlands of the Central Valley. Apparent nesting at Merritt Lake, Monterey County (Silliman 1915), likely represents an extralimital attempt, as the species has not bred elsewhere on the coastal slope of California.

*Northeastern California.* Historic locations of confirmed breeding include Tule Lake and Alturas Meadow, Modoc County; Grasshopper Meadows/Lake and Eagle Lake, Lassen County; and Lake Tahoe, El Dorado County (Grinnell and Miller 1944, egg set data). The southeastern breeding limit was at Lake Tahoe, where terns nested primarily at Rowlands Marsh near the mouth of the Upper Truckee River (Orr and Moffitt 1971). That colony held over 100 pairs.

*Central Valley.* Grinnell and Miller (1944) reported nesting along the Sacramento and San Joaquin rivers (latter near Merced), and at Los Banos, Merced County, Laton and Firebaugh, Fresno County, and Buena Vista Lake, Kern County. The black tern formerly was described as very numerous in the San Joaquin Valley (Ray 1906, Chapman 1908, Tyler 1913, van Rossem 1933). One of few early quantitative estimates was of a colony of “about 200 pairs” at Buena Vista Lake in June 1921 (A. J. van Rossem egg data slip, WFVZ #2470).

### **Recent Range and Abundance in California**

The outline of the breeding range today remains largely unchanged, though the species is extirpated locally at Lake Tahoe and in the Delta. In the San Joaquin Valley, formerly a center of abundance, terns now breed mostly in two small areas of rice fields in the San Joaquin Basin. The species is quasi-extirpated in the Tulare Basin, where it nests irregularly and locally in ephemeral habitats mainly in extremely wet years. Statewide surveys estimated 4153 breeding pairs of black terns in California, 47% in northeastern California and 53% in the Central Valley (Shuford 1998, Shuford et al. 1999, PRBO unpubl. data).

*Northeastern California.* Habitat loss and degradation via development and lowering of water levels eliminated breeding black terns at Lake Tahoe (Orr and Moffitt 1971, Cogswell 1977, D. Shuford pers. obs. in 1998). Today the species reaches its southern limit in the Sierra Nevada at Sierra Valley, Plumas and Sierra counties, and at Kyburz Flat, Sierra County, where breeding is irregular, particularly at Kyburz. Attribution of nesting to Shasta Valley, Siskiyou County (Zeiner et al. 1990, Small 1994), west of the known breeding range, lacks documentation. Extensive wetland loss, particularly in the Klamath Basin, may have been partially offset on the Modoc Plateau by historic creation of shallow-water reservoirs for livestock grazing and recent enhancement for waterfowl (T. Ratcliff, G. Studinski pers. comm.).

In 1997, about 1940 pairs nested at 60 widely scattered sites; about 70.5%, 22.0%, and 7.6% of the terns were in Modoc, Lassen, and Siskiyou counties, respectively (Shuford 1998). The 10 sites with >50 pairs, together comprising 58.7% of the regional population, were Barnum Flat Reservoir, Siskiyou County; Weed Valley, Widow Valley, Bucher Swamp, Boles Meadow, Egg Lake, and Taylor Creek wetlands, Modoc County; and Ash Valley, Red Rock Lakes complex, and Eagle Lake, Lassen County. State and federal refuges held <4% of the population; the rest were mostly on U.S. Forest Service and private lands.

*Central Valley.* Black terns were severely impacted by the great historic loss of Central Valley wetlands and the massive alteration of the natural hydrologic regime. Formerly hundreds of thousands of hectares in both the Sacramento and San Joaquin valleys were subject to inundation from annual or periodic overflow (The Bay Institute 1998). It is unclear how much of this habitat remained through summer, but prolonged snowmelt floods (Apr-June) in the San Joaquin Valley, particularly in the Tulare Basin, likely left that region with the most ephemeral habitat for breeding terns. Water management infrastructure now reduces the frequency of floods 5- to 10-fold and likewise limits their duration (The Bay Institute 1998). Still, today in the closed Tulare Basin in

extreme winters flood waters are diverted into shallow storage basins or run unchecked into fields, leaving potential breeding habitat.

Grinnell and Miller (1944) noted a partial shift of breeding terns to rice fields, but it is unclear how widespread or numerous they were in this habitat, which in 1943 totaled 96,000 ha in California (National Agric. Statistics Serv.; <http://www.nass.usda.gov:100/ipedb/>). Extensive wetland loss in the Sacramento Valley was offset by expansion of rice to the current annual level of 160,000 to 200,000 ha, which may far exceed the average historic extent of shallow-water wetlands available there in spring and summer. By contrast, wetland loss in the San Joaquin Valley was offset to only a minor degree by rice, which has declined there slowly since the mid-1950s. Terns formerly bred in rice fields as far south as Kern County but no longer do so.

Cogswell (1977) concluded that after initial declines from wetland loss tern numbers increased with expansion of rice culture then declined again “recently,” perhaps from pesticide accumulation. The anecdotal nature of his and other’s claims of declines (AFN 24:638, AB 32:1205, AB 39:98) or upswings (AB 31:1185) in tern numbers in the Sacramento Valley in the 1970s and 1980s make them hard to evaluate. Numbers of black terns recorded on surveys of pheasant broods in Butte County, 1976 to 1992 (J. Snowden in litt.), did not show a significant temporal trend but appeared to track the county’s rice acreage. Similarly, the only BBS route in California with moderate numbers of black terns (median = 9, min.-max. = 0-54), in Glenn and Colusa counties, showed substantial variability in numbers and no clear trend from 1971 to 1999 (USGS Patuxent Wildl. Research Center 2000; <http://www.mp2-pwrc.usgs.gov/bbs/retrieval/>).

Surveys in the El Niño year of 1998 estimated 2213 breeding pairs in the Central Valley, of which  $1987 \pm 594$  ( $\pm$ SE) were in Sacramento Valley rice fields (PRBO unpubl. data). Though spread widely in rice, largest numbers there were in the northern Colusa Basin. In the San Joaquin Valley, about 75 pairs bred at five sites in the San Joaquin Basin (70 pairs at two rice areas) and 151 pairs at six sites in the Tulare Basin. Refuges or reserves held <1% of Central Valley terns; the rest were on

private lands. The current tenuous status of the species in the San Joaquin Valley documents a major population decline there over the last 100 years. An apparent shift of abundance to the Sacramento Valley may be illusory, as that area may always have been an important, though poorly documented, breeding area.

*Migratory stopovers.* Estimated numbers of post-breeding or migratory terns at Tule Lake National Wildlife Refuge (NWR), Siskiyou and Modoc counties, July-August 1997, ranged from 1000 to 6000 (Shuford 1998). The only other major stopover site in the state is the Salton Sea, Riverside and Imperial counties, outside the breeding range. Up to 15,000 have been estimated there in early August (Patten et al. in press), but the only census, 13-16 August 1999, tallied 4011 individuals (Shuford et al. 2000). Small (1994) implies numbers have declined at the Salton Sea since 1987, but there is no evidence of this (M. Patten in litt.); numbers of migrants have declined historically on the southern California coast (Garrett and Dunn 1981).

## **Ecological Requirements**

Information on ecological requirements of the black tern in California are restricted mostly to general accounts of habitat use as described below by region. Diet studies are lacking in California, but elsewhere breeding black terns are mainly insectivorous. Fish, however, make up a large part of the diet in some habitats and regions (Dunn and Agro 1995) and may dominate the diet by mass and provide an important source of calcium (Beintema 1997).

*Northeastern California.* Most breeding marshes are dominated by low (<1 m) emergents, typically spikerush (*Eleocharis* spp.) or *Juncus* spp. (Gould 1974, Shuford 1998), and vegetative cover (vs. open water) usually is >80% (Shuford 1998). Taller emergents, such as *Scirpus* spp. (see Shaw 1998), infrequently dominate breeding areas. At Lower Klamath NWR, terns sometimes nest in shallowly-flooded units lacking much live emergent vegetation but dominated instead by residual barley stubble and algae mats. At Boot Lake, Lassen County, in the Warner Mountains at 6560 ft (2000 m), breeding habitat is dominated by a floating yellow pond-lily (*Nuphar luteum* ssp.

*polysepalum*). At Rowlands Marsh, Lake Tahoe, terns formerly nested in pond lily, water smartweed (*Polygonum amphibium* var. *stipulaceum*), or “marsh grass” (Orr and Moffitt 1971). Most floating nests are over water about 25 to 80 cm deep and supported by emergent vegetation, abandoned nests of grebes or Forster’s terns (*Sterna forsteri*), floating boards or logs, floating cowpies, muskrat rafts, reed or algal debris, or small earthen hummocks (Orr and Moffitt 1971, Gould 1974, Shaw 1998, Shuford 1999).

*Central Valley.* Habitat use in this region has shifted greatly historically. Black terns formerly nested in the Central Valley in ephemeral, early successional habitats created by natural overflow of rivers and lakes (Mailliard 1904, Tyler 1913, van Rossem 1933) or by flood irrigation of pasturelands (Chapman 1908). Today few of the Valley’s terns breed in marshes or overflow habitats. Valleywide in 1998, about 2057 pairs (93.0%) bred in rice fields, 151 (6.8%) in flooded agricultural fields, and 5 (0.2%) in emergent wetlands of low-stature (PRBO unpubl. data). All breeding evidence in the Sacramento Valley was from rice, though one colony in Glenn County was in sedges in the corner of a field rather than in the rice itself. Of 226 pairs in the San Joaquin Valley, 66.8% were in flooded agricultural fields with residual crops or weeds, 31.0% in rice, and 2.2% in emergent wetlands of low-stature. In the Sacramento Valley, Lee (1984) reported nests in rice fields were built on top of dirt mounds, about 10 cm high, unintentionally created during field preparation. Water depths at nests ranged from 5 to 15 cm before farmers raised water levels in July.

## **Threats**

*Northeastern California.* Black terns in this region currently are not widely threatened. Recent changes, for Endangered Species Act compliance for fish and other water priorities, will reduce water at Klamath Basin refuges, particularly in summer and fall (D. Mauser pers. comm.), which might impact breeding and migratory terns. Concern has been expressed over the potential impacts of increasing human recreation on waterbirds at Eagle Lake (Gould 1974, Shaw 1998). This is not

likely, though, to be a widespread regional problem given the shallow, densely-vegetated marshes preferred by the terns are not suitable for fishing and boating.

*Central Valley.* The region's terns currently are vulnerable to lack of protection on private lands and potential changes in water allocation priorities to accommodate California's burgeoning human population. Large shifts from rice to other less water-consumptive crops likely would greatly impact terns. Agricultural practices that rapidly draw down water levels in rice fields have exposed tern nests to rat predation only to later destroy renesting attempts when fields were reflooded above initial levels (Lee 1984). Three egg yolks collected from a colony in rice fields in the Sacramento Valley in 1969 had 8.0, 9.1 and 11.8 ppm DDE (Greenberg 1972), but there is no evidence of deleterious effects of pesticides or other agricultural chemicals on terns breeding there. Dunn and Agro (1995) and Weseloh et al. (1997) reviewed the impacts of contaminants in tern eggs but found no evidence of impaired reproduction. They concluded direct chemical toxicity is generally not a problem with these terns, but pesticides may reduce favored insect foods. Loss of insect diversity or biomass might lead to chick starvation.

### **Management and Research Recommendations**

- Focus on restoring, enhancing, and providing long-term protection for suitable wetlands and on maintaining isolation of colonies from humans and ground predators.
- Protect key stopover areas, such as Tule Lake and the Salton Sea.
- Conduct research on the foraging and nesting ecology of black terns in California, on movements of banded birds with changing water conditions, and on population demography to identify which breeding habitats are sources or sinks for the overall population.

### *Northeastern California*

- Try to establish spikerush-dominated marshes, the species' main breeding habitat in the region, on refuges that currently hold few breeding black terns.

## *Central Valley*

- Consider enhancing tern habitat primarily in years of exceptional runoff, when it will do the most good, thereby exploiting the tendency of seabirds to exhibit boom and bust cycles of productivity. In such years, try to increase limited breeding on newly restored wetlands on refuges near Los Banos by spreading water over larger areas within the Eastside Bypass near Los Banos and the James Bypass/Fresno Slough south of Mendota Wildlife Area or by drawing water from upstream, circulating it through refuge ponds, and draining it back into the bypass downstream. Maintain a slow but steady flow to reduce the chances of botulism.
- When possible, flood fields containing residual vegetation or crop stubble for use as breeding habitat. Explore retiring fields with marginal crop yields and putting them in a conservation bank to be flooded when water is available. Weigh such flooding against possible mortality of waterbirds from botulism disease outbreaks, which might be reduced by rotating fields to be flooded and choosing areas with no prior evidence of disease.
- Expand research to address concerns about the potential effects of agricultural pesticides and crop cultivation practices on black terns (Lee 1984).
- Conduct studies to assess whether the value of rice fields to black terns equals that of ephemeral overflow habitat or natural marshes.

## **Monitoring Needs**

The state's breeding population should be monitored every 3-5 years, during typical climatic and habitat conditions, using methods responsive to the shifting of breeding locations.

*Northeastern California.* Terns should be surveyed in mid-June by counts of undisturbed adults taken from peripheral or within-wetland sites where observers do not attract mobbing terns. Surveys should be based on a random or stratified sampling of a subset of potential breeding sites, accounting for the difficulty of reaching some.

*Central Valley*. This population should be monitored by a set of standardized roadside transects in rice fields in the Sacramento Valley run in early June.

## **Acknowledgments**

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